

Foundations 2: Multinomial-Processing-Tree Modeling

Basic Methods and Recent Advances

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Workshop Day 1: Essentials of MPT Modeling (Monday, 14.06.2021, 9:00-13:00)

Slides with audio explanations (please study before the Interactive Online Session!):

- **Basics** (Instructor: EE)
 - Introduction to standard MPT models (logic, examples, advantages, limitations)
 - Model development (model construction, paradigm, data structure, identifiability)
 - Parameter estimation (maximum likelihood, minimum χ^2 , power-divergence statistics)
 - Model assessment (G^2 , Pearson's χ^2 , and the PD^λ family of goodness-of-fit statistics)
- **Application I** (Instructor: EE)
 - Introduction to multiTree: EQN syntax, data files, batch analysis
 - Practical exercises: Demonstrations using the Paired-Clustering Model
 - Order constraints: Demonstrations using the Paired-Clustering Model

Interactive Online Session:

- 9:00 – 10:00 **Questions** & clarifications of practical exercises
- 10:00 – 11:00 **Advanced features of multiTree** (Instructor: EE)
 - Identifiability concepts and checks provided by multiTree
 - A priori and post hoc statistical power analyses
 - Model selection (AIC, BIC, NML, and FIA criterion)
- 11:00 – 13:00 **Application II** (Instructor: EE & DH)
 - Workflow with multiTree: Developing and testing a new MPT model
 - Using advanced features in multiTree
 - Optional: Testing interactions (EE)

Workshop Day 2: Advances in MPT Modeling (Tuesday, 15.06.2021, 13:00-17:00)

Slides with audio explanations (please study before the Interactive Online Session!):

- **Bayesian hierarchical MPT modeling** (Instructor: DH)
 - MPT models & heterogeneity
 - Hierarchical MPT models
 - Bayesian estimation with MCMC sampling
 - Adding continuous covariates
- **Modeling continuous data using mixture models** (Instructor: DH)
 - Modeling response times with histograms (MPT-RT)
 - Parametric modeling with generalized processing trees (GPT)
 - Serial process model for response times (RT-MPT)

Interactive Online Session:

- 13:00 – 14:00 Questions & clarifications
- 14:00 – 16:00 Application III (Instructor: DH)
 - Practical exercises on hierarchical MPT modeling using TreeBUGS
 - Basics: Model fitting, convergence, plots, model fit
 - Advanced: Within-/between-subject comparisons, covariates, simulation
- 16:00 - 17:00 Application IV (Instructors: DH & EE)
 - Questions and answers
 - Developing and testing (new) models suggested by the participants